CLAIMS

1. An apparatus for producing a spread fiber bundle, comprising a group of at least two rollers kept in contact with a running fiber bundle, and a base body reciprocating to be repetitively brought into contact with and kept away from the running fiber bundle as the axial center of said base body moves relatively to the running fiber bundle, said base body being provided between at least a pair of rollers adjacent to each other, of said group of rollers.

2. An apparatus for producing a spread fiber bundle according to claim 1, wherein two more said base bodies are provided.

3. An apparatus for producing a spread fiber bundle according to claim 1 or 2, wherein the base body is a rotatable roller.

4. An apparatus for producing a spread fiber bundle according to any one of claims 1 through 3, wherein at least one roller of said group of rollers or at least one of said base bodies comprises a roller having a plurality of projected support portions extending along a direction of the rotating axis of the roller and projected from the surface of the roller, at the periphery of the roller.

5. An apparatus for producing a spread fiber bundle according to claim 4, wherein at least one of said rollers having projected support portions is positioned upstream of said base body, and is rotated in the same direction as the running direction of the running fiber bundle, with its peripheral surface speed kept lower than the running speed of the running fiber bundle.

6. An apparatus for producing a spread fiber bundle according to claim 4, wherein at least one of said rollers having projected support portions is positioned upstream of said base body, and is rotated in the direction reverse to the running direction of the running fiber bundle.

7. An apparatus for producing a spread fiber bundle according to any one of claims 4 through 6, wherein in said roller having projected support portions, the angle (θ) formed between the respectively adjacent support portions at the roller axis is 5 to 50 degrees and the relation between the height of each support portion (t) and the radius of the roller (r) satisfies formula $t > r[1/\cos(\theta/2) - 1]$.

8. An apparatus for producing a spread fiber bundle according to any one of claims 1 through 7, wherein at least one roller

positioned downstream of said base body, of said group of rollers is a brake roller.

9. An apparatus for producing a spread fiber bundle according to any one of claims 1 through 7, wherein at least one roller positioned downstream of said base body, of said group of rollers is a dancer roller.

10. A method for producing a spread fiber bundle, comprising use of an apparatus for producing a spread fiber bundle as set forth in any one of claims 1 through 9, and the step of running a fiber bundle zigzag along said rollers of said group of rollers at a fiber bundle running speed of 3 to 20 m/min, with said base body reciprocated at a vibration frequency of 1 to 100 Hz with an amplitude of 1 to 25 mm, for spreading the fiber bundle.

11. A method for producing a spread fiber bundle according to claim 10, further comprises a step of heating the surface of at least one roller of said group of rollers or the surface of at least one base body of said base bodies, or the fiber bundle per se.

12. A method for producing a spread fiber bundle according to claim 10 or 11, further comprises a step of hitting the fiber bundles by means of a reciprocating body or a rotating body while

heating the fiber bundle at a position upstream of said base body in the running direction of the fiber bundle, using the apparatus for producing a spread fiber bundle as set forth in any one of claims 1 through 9.

13. A method for producing a spread fiber bundle according to claim 10 or 11, further comprises a step of vibrating the fiber bundle by means of a reciprocating body or a rotating body at a vibration frequency lower than that of the reciprocating vibration frequency of said base body, at a position upstream of said base body in the running direction of the fiber bundle, using the apparatus for producing a spread fiber bundle as set forth in any one of claims 1 through 9.

14. A method for producing a spread fiber bundle according to any one of claims 10 through 13, wherein the tensile modulus of elasticity of the fiber bundle is 200 to 700 GPa.

15. A method for producing a spread fiber bundle, according to any one of claims 10 through 14, further comprises a step of blowing a gas to the running fiber bundle at a position at least either upstream or downstream of said base body in the running direction of the fiber bundle, using the apparatus for producing a spread fiber bundle as set forth in any one of claims 1 through 9.

16. A method for producing a spread fiber bundle according to claim 15, wherein the temperature of the gas is 70 to 250°C and the gas blowing pressure is 0.1 to 0.5 MPa.

17. A method for producing a spread fiber bundle according to any one of claims 10 through 16, further comprises a step of supporting the running fiber bundle on a belt having a width wider than that of the fiber bundle width and curved to be projected on the side to be kept in contact with the fiber bundle, at a position downstream of said base body in the running direction of the fiber bundle, using the apparatus for producing a spread fiber bundle as set forth in any one of claims 1 through 9.

18. A method for producing a prepreg which comprises the step of impregnating a resin into the spread fiber bundles produced according to the method of producing a spread fiber bundle as set forth in any one of claims 10 through 17.